

# *National Park Service*

- **Hozomeen Housing Sustainable Design Concepts**
- **North Cascades NPS Complex**



# *Sustainability*

- *adj.*: of, or relating to a method of harvesting a resource so that the resource is not depleted or permanently damaged.



# *Site*

Hozomeen Ranger Station is a remote site on the shore of Ross Lake, Washington, one mile south of the Canadian border within Ross Lake National Recreation Area.



# *Previous Housing*



# *Previous Bunkhouse*



# *Previous Storage*



# *Previous Shop*



# *New Facility Considerations*

- Health, safety and comfort of the users
- Impact on the environment
- Long and short term costs





# *Technology*

- Solar Applications
  - Energy Conservation Techniques
  - Manufactured Wood Products
  - Sustainable Forest Practices
  - Recycled / Recyclable Materials
  - Waste Handling
- 



# *Solar Applications*

- Structures sited for maximum solar gain
- Solar voltaic energy system
  - Primary Energy Source
  - Propane Powered Generator Back-up

# *Solar Voltaic Power System*

- **System Components**
- array            7,200 W Solarex
- batteries        48kWwh Absolyte - IIP GNB
- controller       Ananda Power Technologies
- inverter          SW 5548 Trace Engineering
- generator        25kW Generac Propane

# *Solar Panels*



# *Inverters*



# *Controllers*




# *Batteries*





# *Energy Conservation Techniques*

- High rated insulation with vapor/moisture barriers
  - Double pane insulated windows
  - Hydronics space heating utilizing domestic hot water heater
  - Low wattage appliances and lighting
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# *Insulation & Vapor Barrier*



# *Windows & Moisture Barrier*



# *Hydronics System*



# *Low Wattage Appliances*



SUN FROST RF16  
with 13" cabinet



# *Manufactured Wood Products*

- TJI Floor Joist System
  - OSB joists
- Laminated Veneer Lumber (LVL)
  - Headers
  - Perimeter Joists

# *TJI Joist System*



# *LVL Header*






# *Sustainable Forest Practices*

- Structural Lumber
  - British Columbia Sustainable Forest Practices Code
- Cedar Shake
  - Scientific Certification Systems Inc.



# *Recycled / Recyclable Products*

- Insulation
    - 25% recycled products
  - Carpet
    - 85% recycled products
  - Metal Roof
    - Recyclable Material
  - Shop / Recycle Building
    - 25% recycled lumber from old compound
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# *Carpet / Hydronics Heater*



# *Metal Roof System*



# *Shop*





# *Waste Handling*

- Upgraded Septic System
  - State certified design
- Recycle Shed
  - Recyclable collected, sorted and hauled
- Earthtub
  - compost organic household waste

# *Septic Upgrade*



# *Recycle Shed*




# *Earthtub*






# *Considerations Review*

- Facilities Meet NPS Housing Standards
  - Minimal Environmental Impact
    - Previously impacted building site
    - Recycled & recyclable building materials
    - Clean Energy Source
    - Comprehensive Waste Program
  - Within Similar Construction Costs For Area
    - + 25% remote site factor
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# *Housing Units*

- Two separate Duplex units
    - total of four individual quarters
    - each unit 1218 sq.ft.
  - Individual quarters
    - two bedroom, one bath, kitchen, dining area, living room, screen porch, storage closets
  - Shared facilities
    - laundry
    - trash / recycle / organic composting
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# *Hozomeen Housing*

